NEW MEXICO TECH

SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Technology and Commercialization Initiatives Overview

Presented to New Mexico Legislative Committee on Science, Technology, and Telecommunications

October 29, 2014

NMT Institutional Values

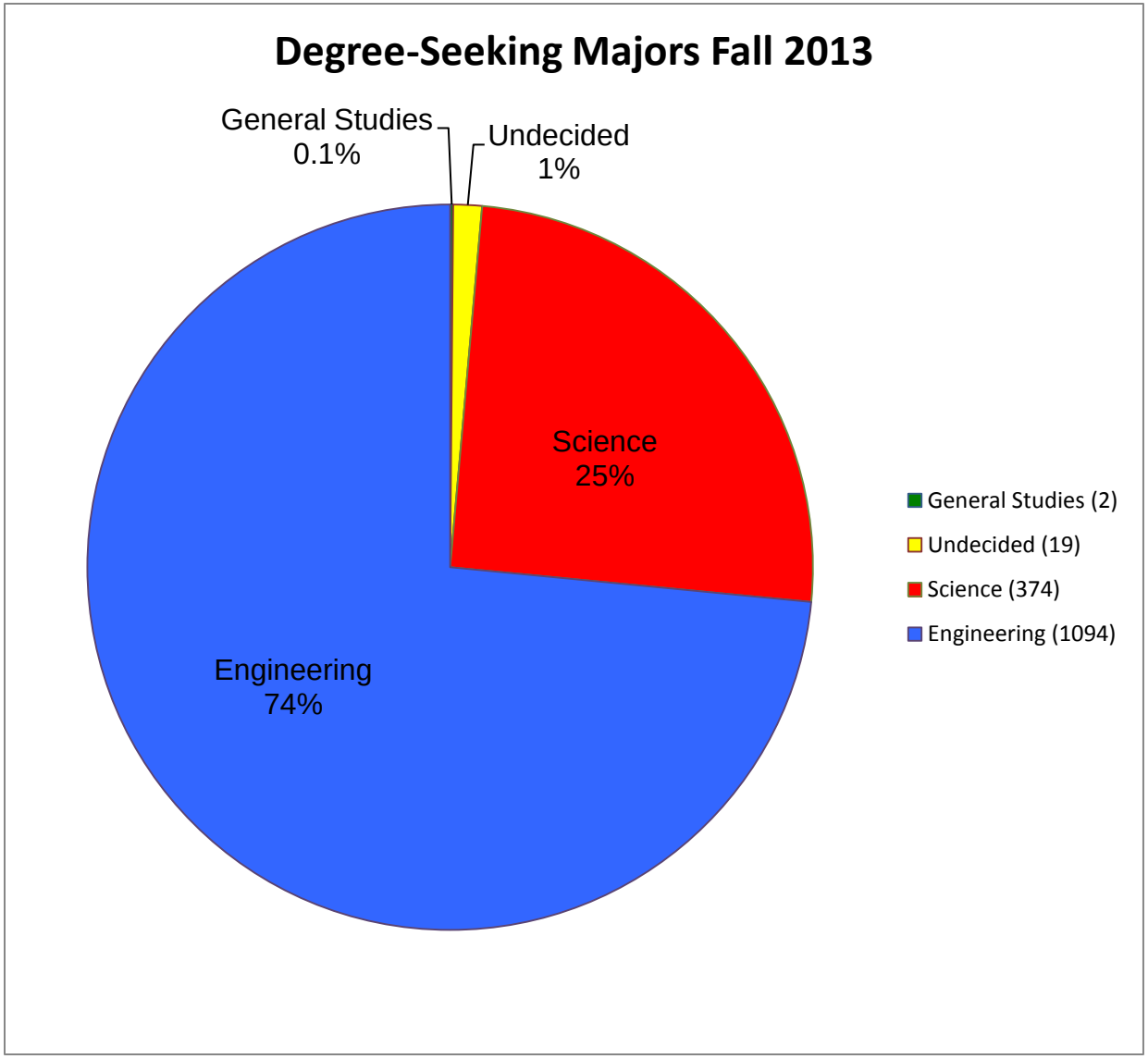
- Creativity
- Excellence
- Integrity
- Collegiality and citizenship
- Service
- Leadership
- **Commitment to economic prosperity and technological development**

NMT Research and Education: Closely Aligned

- Bold and innovative research initiatives with strong student components

- Enabling technologies and training programs to bolster both public and private sector success and competitiveness

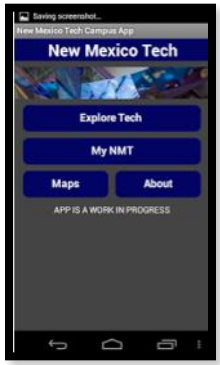
NMT Undergraduate Enrollment for Fall 2013



Student Engagement in Research

Approximately 500 out of our 2100 students are employed in research-related positions

8 Freshman Research/Design Project Options



- Sustainability
- Mobile Computing
- Astronomy
- Aerospace
- Robotics
- Explosives
- Bioengineering
- Watershed

Introduction to Engineering ES 110:

New Engineering Lab – latest technology for data collection and 3D printing

Students learn to:

- Collect data (Elvis board)
- Analyze data
- Design and build catapult
- Make measurements
- Improve design
- Present results

Smart Classroom Technology

- 64% of general lecture classrooms contain upgraded technology

- Student response to Lecture Capture:

Technology and Commercialization Examples

- Center for Leadership in Technology Commercialization
  - Two project examples
- Aerospace Rocket Launcher
- Heliostat Control System
- CAaNES
- Question and Answer session

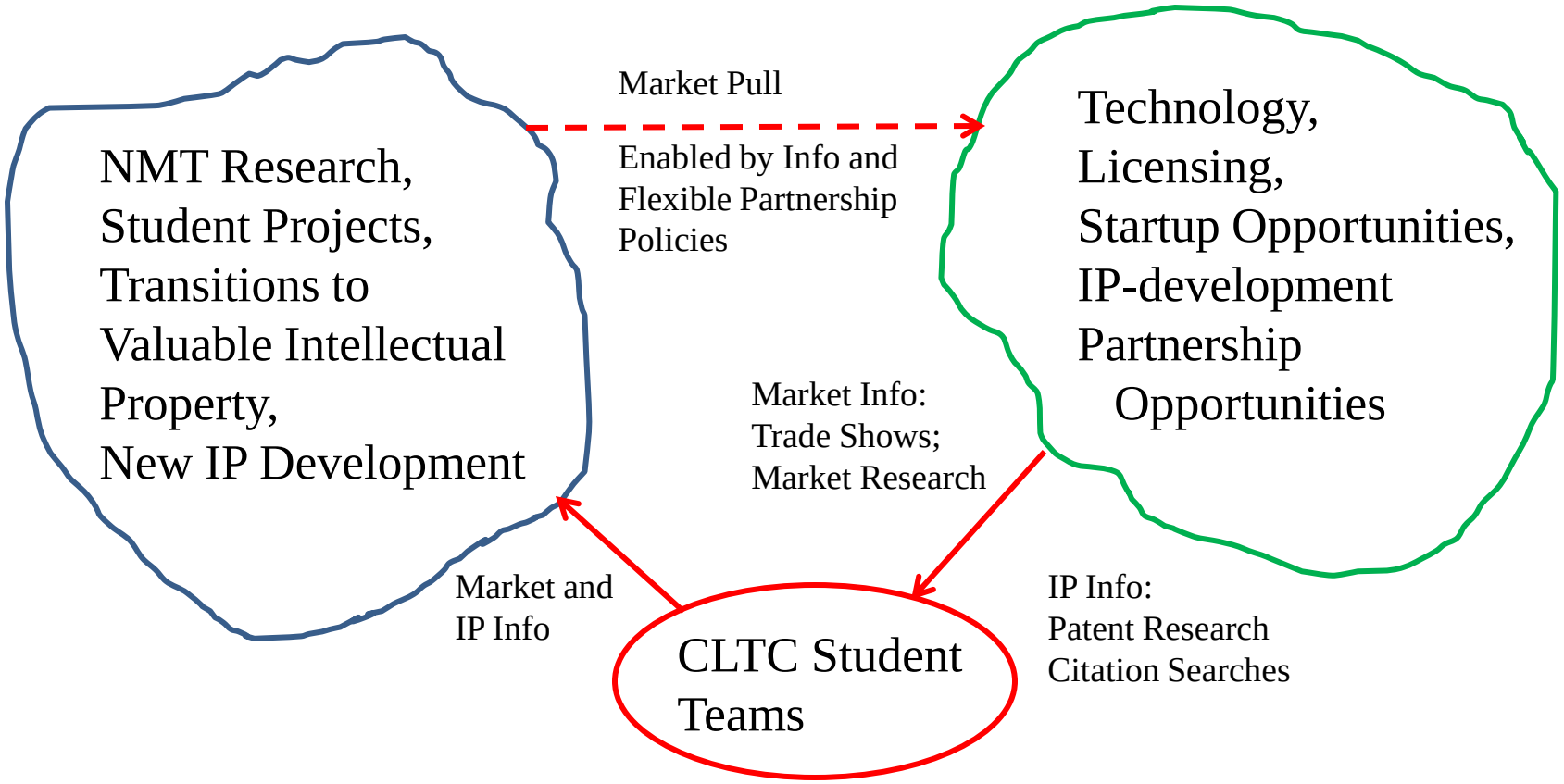
The Center for Leadership in Technology Commercialization (CLTC):

Peter Anselmo, Associate Professor, Management

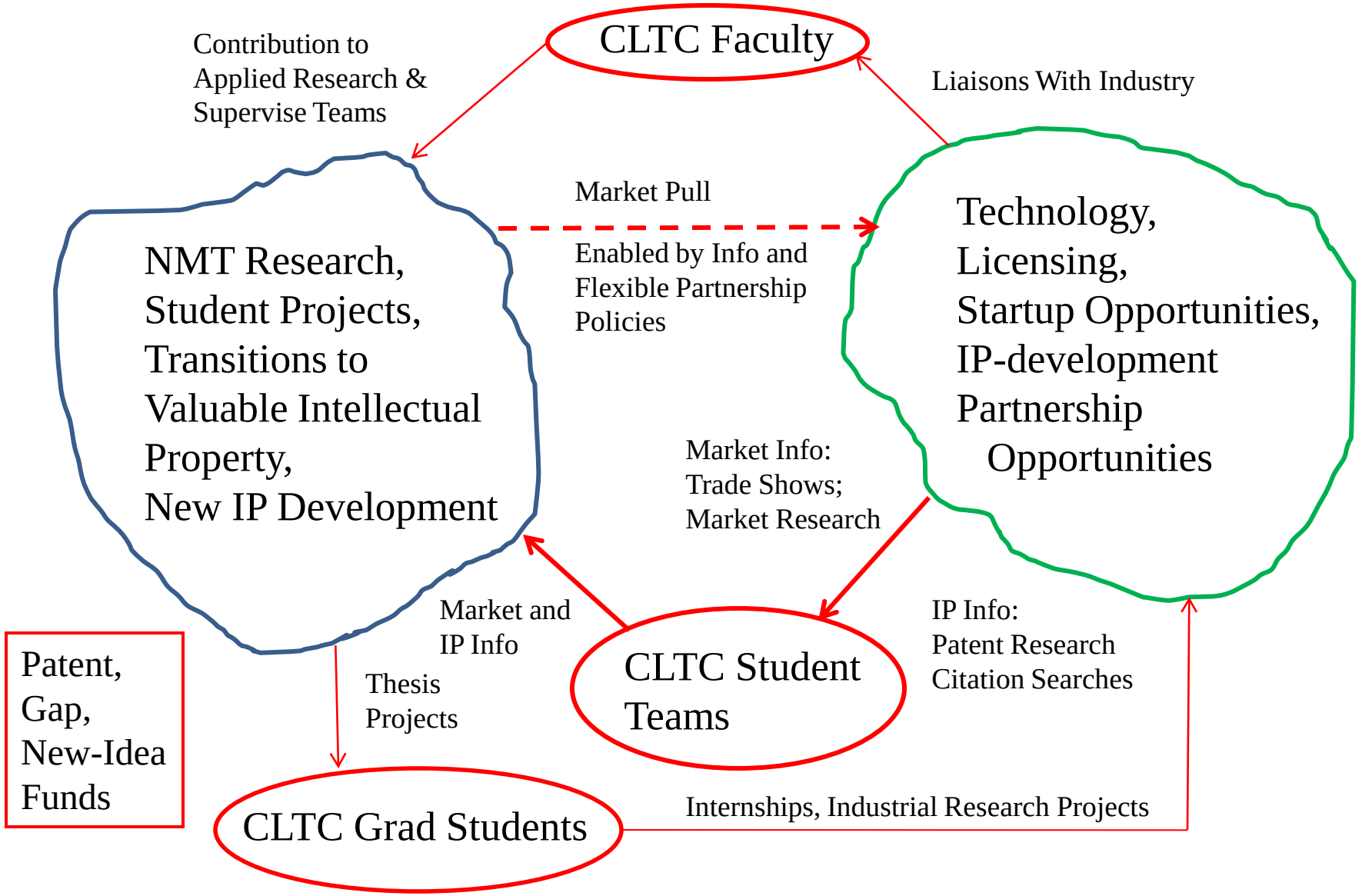
NMT Research,
Student Projects,
Transitions to
Valuable Intellectual
Property,
New IP Development

Technology,
Licensing,
Startup Opportunities,
IP-development
Partnership
Opportunities

Current Situation: A Gap Between NMT and Technology Commercialization Opportunities



The Current Solution Enabled by a Seeded CLTC



The End Result: The NMT Innovation Factory

Alliances

- Entrepreneurship Bootcamp, Dr Raul Deju (Ca Bay Area)
- Internal faculty advisory board
- External advisory board
  - Verge Fund and other local VC and Angel investors
  - Current local supporters and future mentors
- Also, Alliances with
  - John F. Kennedy University
  - Lawrence Livermore Labs

Funding

- Private sector emphasis
- High-end crowdfunding
  - Request ~$25K and up in 5 annual installments from individuals and foundations
  - Some success so far – projects started in January!
  - Larger commitments are, of course, welcome
- Corporate foundations and NSF and other partners
- Starting to work with potential large donors – build for the future

Entrepreneurship University Model

- Unique, valued student experiences and outcomes
  - Student projects assess initial feasibilities
- Enhance NMT researcher connections with markets
  - Industry connections via our students (trade shows, etc)
  - Connections with mentor network headed by Dr Deju
- Provide incubator services without some of the costs

AND, the HOLY GRAIL:

- New IP and/or new firms!!!

The Center for Leadership in Technology Commercialization (CLTC)

Project examples

Lab Commercialization Project

- Student team partnership with Lawrence Livermore Laboratories (LLL)

- LLL technology modified for marketability
  - Students initiated customer contacts
  - Student team working with LLL personnel
  - Working to find financing for modifications → NMT Ownership share

- Outcome: NMT will license LLL technology for spinoff company

Going Forward With LLL

- NDA in place – based on relationships and mutual interests
- CRADA to come
- Engineering Student Design Projects
- A model for commercialization of other LLL technologies through the CLTC and/or student design projects

NMT Drug Discovery Research

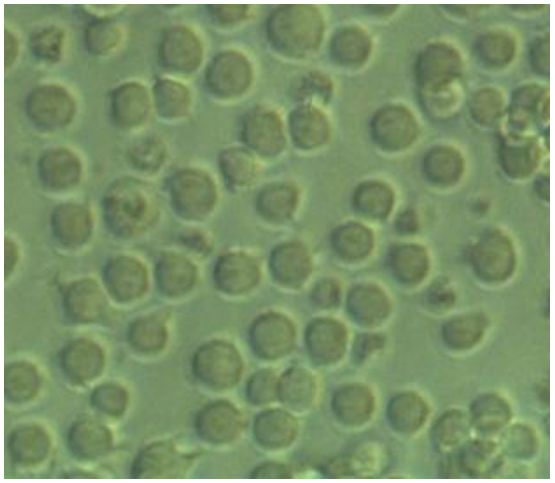
Snezna Rogelj, Professor, Biology

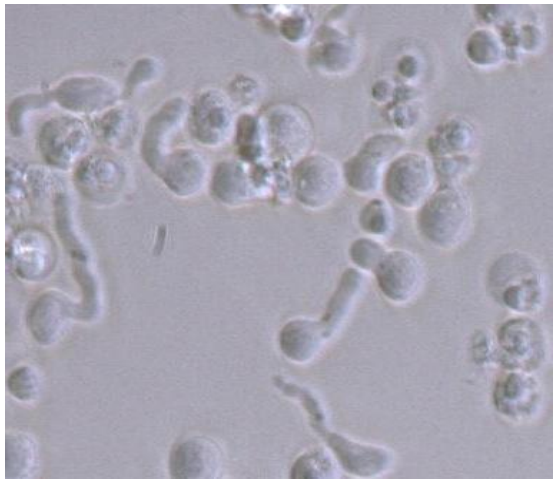
- Cancer: 2nd leading cause of death in US
- Treatment: >$100 billion/yr
- Chemotherapy fails due to drug resistance
- Paclitaxel (2009):
  - $40K/patient/yr
  - US $1.6B
  - Resistance: broad

NMT Drug Discovery Research

Anti-cancer drugs

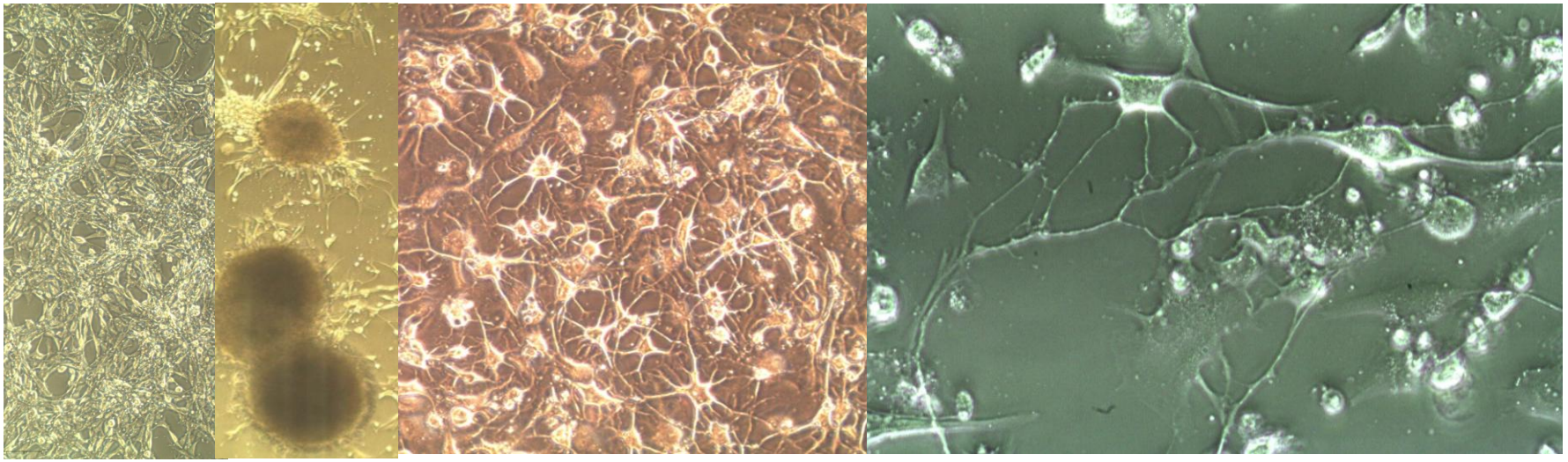
- New drug: Rigidin
  - MOA similar to paclitaxel
  - Insensitive to efflux pumps/development of resistance
  - **Patented thru NMT**





NMT Drug Discovery Research

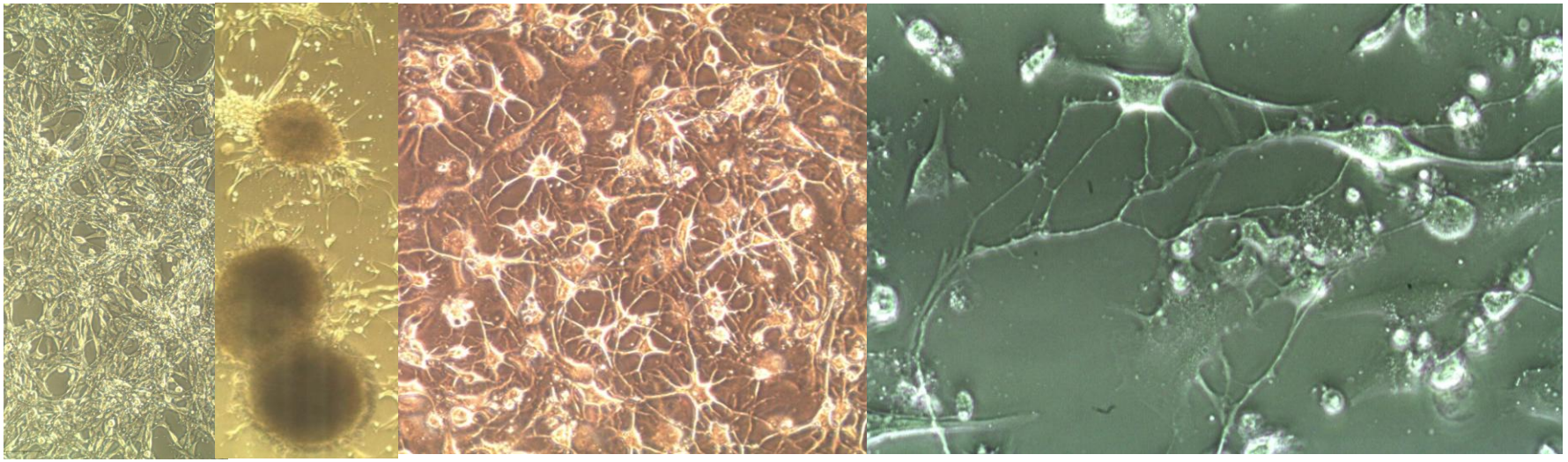
Anti-cancer drugs



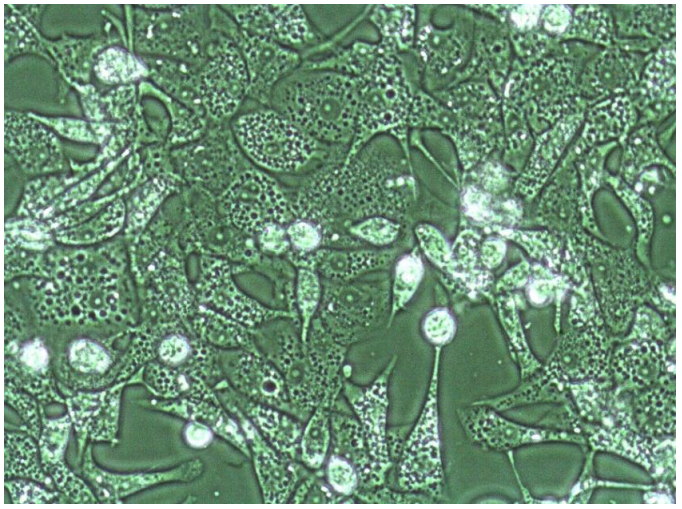
- AKS Hydroxamic acid family
  - Glioblastoma: deadliest/fastest
- Stop cancer cell replication
- Normalize
- **Patented through NMT**

NMT Drug Discovery Research

Anti-cancer drugs

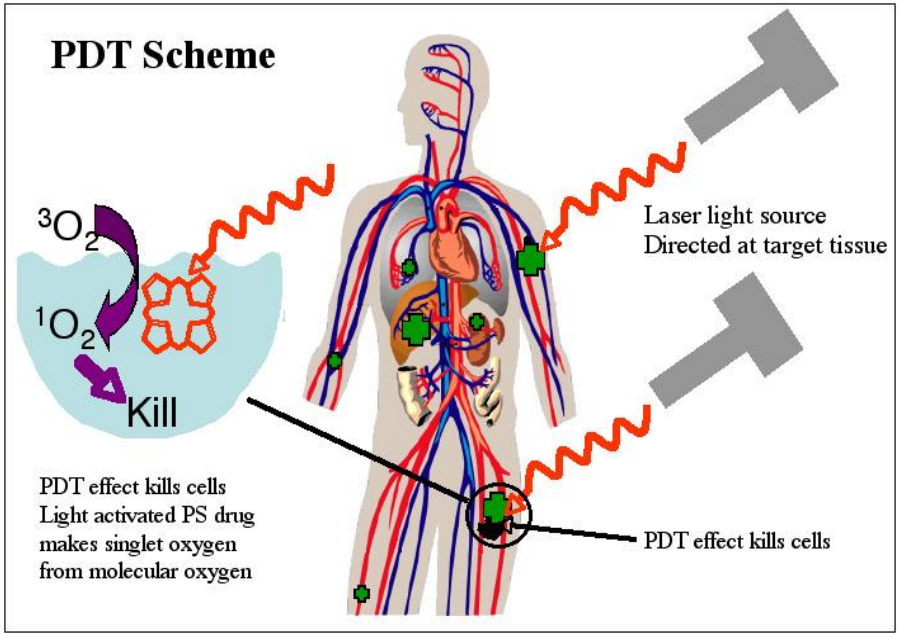


- AKS Hydroxamic acid family
  - Kill every cancer tested (~>10)
  - Kill in a new way
  - Resistant to resistance
  - Brazilian collaboration
- **Patented through NMT**

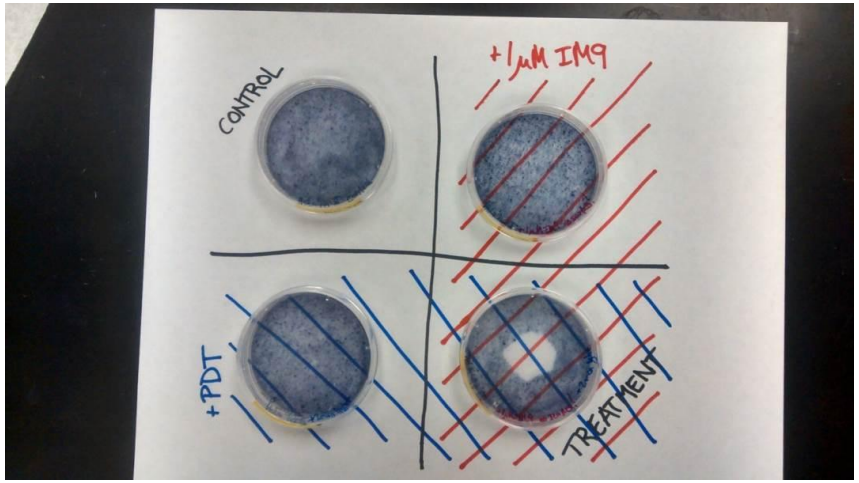


NMT Drug Discovery Research

Anti-cancer drugs

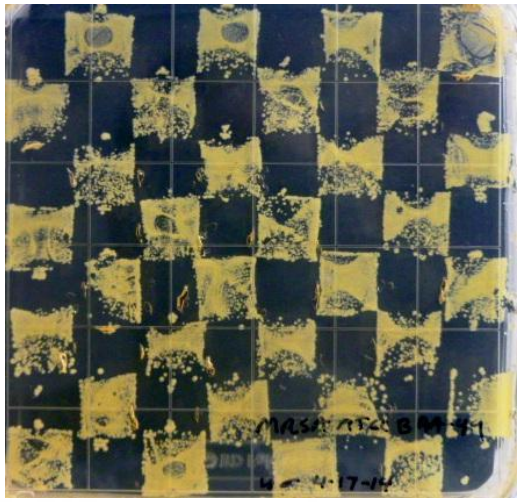


- IM9 series
  - Activated by light
  - Permits selection
  - Kills completely
  - May immunize patient against that cancer



NMT Drug Discovery Research

Anti-bacterial drugs



- IM9 series
  - Activated by light
- Targets MRSA, VRE etc
- Kills 10^8 MRSA with 2min light
- Reverses resistance to standard antibiotics

Engineering Initiatives

Aerospace Initiatives

Julie Ford, Professor, Mechanical Engineering

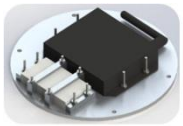
- Aerospace student projects: 1st year – graduate
- Students acquire essential engineering skills and improve the competitiveness of New Mexico educational and industrial sectors
- Develop rocket launch facility at the Spaceport

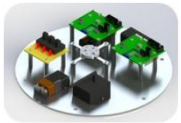
Freshman Living Learning Community

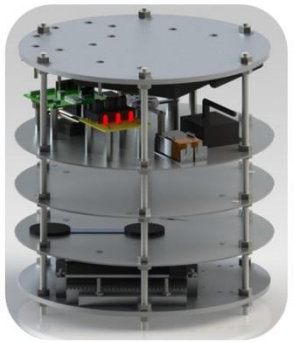
- How to do research?
- How to communicate effectively?
- Learn aerodynamics
- Visit Spaceport
- Design a nose cone for a rocket

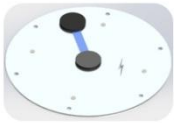
Structural Health Monitoring (SHM) Junior/Senior Design Team

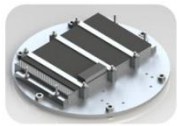
- Develop SHM capability for space structures
- Evaluate via NASA high altitude balloon and rocket launches at Spaceport
- Successful launches, 2013
- Future launch: 2015











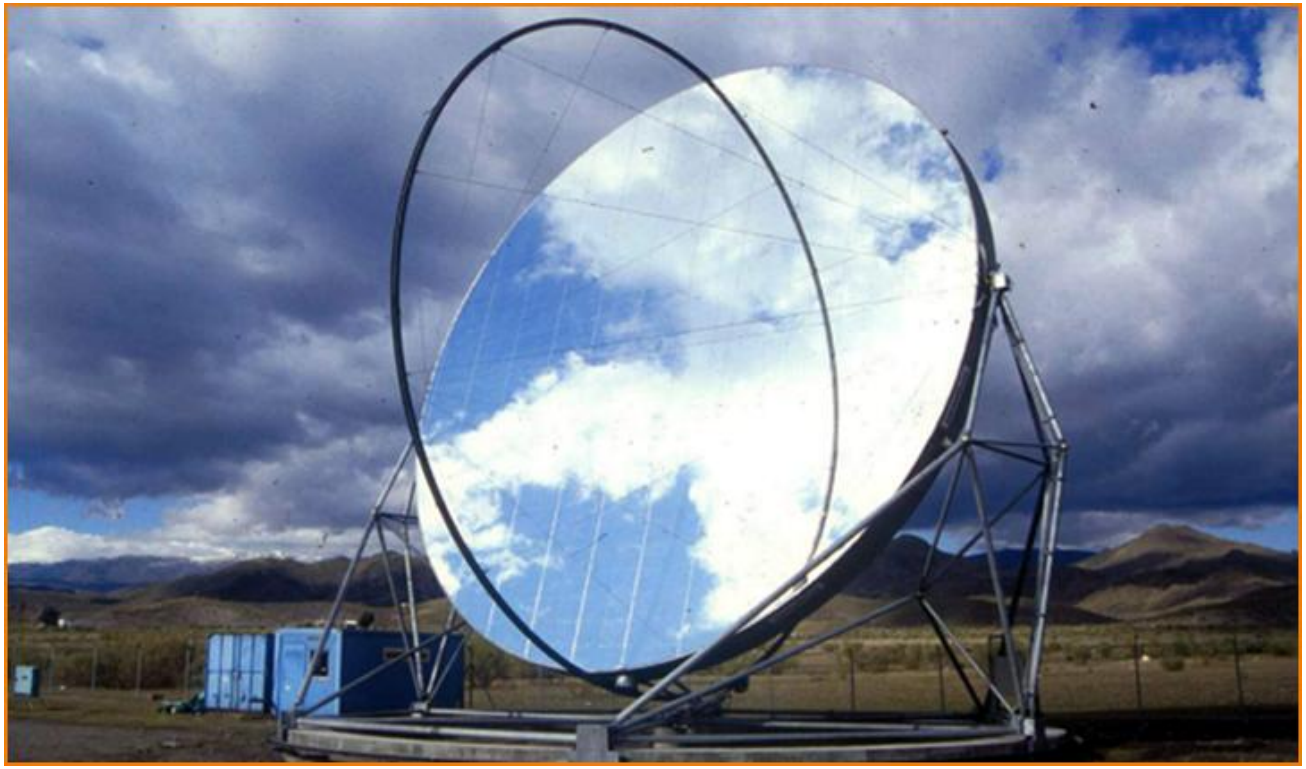
Experimental Sounding Rocket Junior/Senior Design Team

- International competition in Green River, UT sponsored by SpaceX
- Fly 10lb. payload to 25,000 ft.
- Finished 1st in Advanced Category in June, 2013
- Set altitude record

Rocket Launcher Project

- Leverage student experience in aerospace projects
- Proposal made to the state for RPSP funding to develop a rocket launcher at the Spaceport
- Approach
  - Begin with small size for research and student teams
  - Progress to intercollegiate competitions in New Mexico
  - Culminate in large size to launch suborbital class rockets for commercial businesses
- Create new business in New Mexico

Heliostat Control System: David Grow Assistant Professor, Mechanical Engineering



A heliostat is a device or system that uses a mirror to concentrate the sun's rays at a specific point.

Background

- Students developed and patented a unique liquid ballast control system which greatly reduces costs
- Funded by EPA to fabricate two prototypes to demonstrate technology

SolidWorks Model of 2nd Prototype

Commercialization

- Received Phase I funding in 2014 from VentureWell, a higher education network that cultivates revolutionary ideas and promising inventions
- Submitted proposal for Phase II funding
- Allows student entrepreneurs to take the important 1st step toward launching a business

Fabrication & Test of 2nd Prototype

Computational Analysis & Network Enterprise Solutions (CAaNES): Srinivas Mukkamala

Research to Practice:

Solving Cyber Assurance Problems of

National Importance

Acknowledgements

- New Mexico State Legislators and Governors
- Legislative and Executive Staffers

Recognizing the Potential Early on (2001) and Supporting us

- Representative Luciano 'Lucky' Varela
- Representative Don Tripp
- Senator Late Ben Altamirano
- Senator Joseph Fidel
- David Abbey
- Manu Patel
- Charles Sallee